

TITLE OF THE INVENTION

APPARATUS FOR LOADING DISC CARTRIDGE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Korean Patent Application No. 2003-50265 filed on July 22, 2003 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates to an apparatus for accommodating a disc cartridge and loading the disc cartridge in a drive, and more particularly, to a loading apparatus which has a mechanism that prevents loading the disc cartridge in a reverse direction.

2. Description of the Related Art

[0003] In general, a disc drive includes a main body that includes an optical pickup that performs recording and/or reproduction with respect to a disc, a loading apparatus to accommodate a disc cartridge and to load the disc cartridge in the main body, and a cover to cover the main body. When the disc cartridge is accommodated on the tray and the tray is pushed into the main body, a shutter of the disc cartridge is opened inside the main body so that the optical pickup can access the disc in the disc cartridge.

[0004] In order to perform the above-described normal operation, the cartridge must be inserted so that a portion of the disc cartridge having the shutter enters first. If a user inserts the disc cartridge back to the front (i.e., in a reverse direction in which the shutter enters last), both elements in the main body and the disc cartridge may be severely damaged.

SUMMARY OF THE INVENTION

[0005] To solve the above and/or other problems, the present invention provides a loading apparatus which has a mechanism to prevent the disc cartridge from being inserted in a reverse direction.

[0006] Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0007] According to an aspect of the present invention, a disc cartridge comprises a shutter capable of opening/shutting at one side of the disc cartridge, and an area where the shutter is installed is concavely formed corresponding to a thickness of the shutter.

[0008] According to an aspect of the present invention, the disc cartridge has a step between a low area at the side where the shutter is installed and a remaining area including a reference area, where the low area includes a movement range during opening/shutting of the shutter, and an area irrelevant to the movement range.

[0009] According to an aspect of the present invention, when the disc cartridge is to be inserted in a reverse direction, the reverse insertion of the disc cartridge is prevented in advance to avoid malfunction by the step on the surface of the disc cartridge, which prevents a reverse insertion of the disc cartridge.

[0010] According to an aspect of the present invention, a protruding portion having a height corresponding to the step of the disc cartridge is formed on an upper surface of the tray at a position corresponding to an area that is not included in the movement range of the shutter of the low area of the disc cartridge when the disc cartridge is normally inserted.

[0011] According to an aspect of the present invention, the protruding portion is formed to overlap the reference area when the disc cartridge is inserted in a reverse direction.

[0012] According to an aspect of the present invention, when the disc cartridge is inserted in the reverse direction, one side of the disc cartridge is lifted by the protruding portion.

[0013] According to an aspect of the present invention, the one side of the disc cartridge is lifted by the protruding portion such that the disc cartridge is caught by an upper portion of a tray inlet of the main body and the disc cartridge is not loaded so as to prevent a damage due to a malfunction.

[0014] According to an aspect of the present invention, the protruding portion can be formed to have a predetermined area in a corresponding area or a shape of a protrusion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] These and/or other features and advantages of the invention will become apparent and more readily appreciated by describing in detail embodiments thereof with reference to the accompanying drawings in which:

FIG. 1 is an exploded perspective view illustrating a disc drive using a loading apparatus according to an embodiment of the present invention; and

FIGs. 2A and 2B show holding states when the disc cartridge is inserted with front and rear sides and reversed front and rear sides according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0016] Reference will now be made in detail to embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

[0017] Referring to FIG. 1, a disc drive using a loading apparatus according to an aspect of the present invention includes a main body 200. The main body 200 includes a turntable on which a disc D is accommodated and an optical pickup 230 that records and/or reproduces with respect to the disc D. The main body further includes a tray 240 to accommodate a cartridge 20 containing the disc D and which loads the cartridge 20 in the main body 200, and a cover 201 that covers the main body 200. An opening lever 221 opening and shutting a shutter 21 of the cartridge 20 and a clasper 220 clamping the disc D onto the turntable 210 are installed on

the cover 201. While not shown, the tray 240 can accommodate the disc D without the cartridge 20. Additionally, while shown in FIG. 1 as being a two-sided cartridge housing dual sided disc D having dual recording surfaces, it is understood that the cartridge 20 can be a single sided cartridge 20. Further, while shown in the context of an optical disc drive, it is understood that the disc D can be other than an optical disc, such as a magnetic disc or other information media used in a drive. It is further understood that the optical disc can be Compact Discs (CDs), Digital Versatile Discs (DVDs), Blue Ray Discs (BDs), Advances Optical Discs (AODs), and recordable versions thereof.

[0018] According to an aspect of the invention, the tray 240 includes an interference protrusion 244. The interference protrusion 244 formed on the tray 240 is provided as a unit that prevents the reverse insertion of the front and rear surfaces of the cartridge 20. Specifically, the cartridge 20 includes a low area 23 that is a step d lower than a reference area 22. According to an aspect of the invention, the step d of the low area is as large as a thickness of the shutter 21 so that the shutter 21 can slide without hindrance within the low area 23. That is, part of the disc cartridge 20 having the shutter 21 is formed to have a step d depth, which is as deep as the thickness of the shutter 21 so that the shutter 21 can slide in the low area 23. However, instead of having a low area 23 with a consistent depth d, it is understood that the low area 23 can have portions that are lower or higher than the step d area in which the shutter 21 moves.

[0019] According to an aspect of the invention, the interference protrusion 244 on the tray 240 has a height that is the same as or slightly smaller than the depth d of the step. The

interference protrusion 244 is not in an area of the tray 240 corresponding to a portion of the low area 23 that would prevent the opening and shutting of the shutter 21. The interference protrusion 244 is shown formed in an area close to the reference area 22 when the disc cartridge 20 is accommodated on the tray 240 in a reverse direction.

[0020] When the cartridge 20 is successfully accommodated on the tray 240 as shown in FIG. 2A, since the interference protrusion 244 is disposed in the low area 23 formed by the step d in the cartridge 20, the cartridge 20 does not interfere with the interference protrusion 244. Thus, the tray 240 can be loaded into the main body 200. However, when the cartridge 20 is accommodated on the tray 240 as the front and back sides of the cartridge 20 are reversed, as shown in FIG. 2B, the cartridge 20 is lifted by interfering with the interference protrusion 244. In this state, even if there is an attempt to forcibly insert the tray 240 into the main body 200, since the upper portion of the cartridge 20 contacts the cover 201, the tray 240 cannot be inserted. Therefore, when the front and rear sides of the cartridge 20 are reversed, the cartridge 20 cannot be inserted into the main body 200 due to interference with the interference protrusion 244. In contrast, when the front and rear sides are correctly inserted as shown in FIG. 2A, the cartridge 20 does not interfere with the interference protrusion 244, and the cartridge 20 does not contact the cover 201 so as to allow insertion.

[0021] It is understood that the protrusion 244 could be placed in other locations according to other aspects of the invention. Additionally, while shown as a protrusion 244, it is understood that ridges or stepped areas could be used to form a protruding area that similarly interacts with

the reference area 22 when the disc cartridge 20 is inserted incorrectly but which receives the low area 23 when the disc cartridge 20 is correctly inserted. It is further understood that protrusions 244 could be on the cartridge 20 with the corresponding low area 23 being on the tray 240. Also, it is understood that the low area 23 could be a groove or opening into which the protrusions 244 are received without forming a common surface with the area in which the shutter 21 moves.

[0022] While described in terms of a tray 240, it is understood that the present invention could be used with a caddy that is removable from the main body 200. It is further understood that, instead of contacting the cover 201, a blocking element could be used to block the insertion of the cartridge 20. Such an element could be disposed on the cover 201, or elsewhere in the drive. Further, while shown as being raised above or below the tray 240, the protrusion 244 could instead force the cartridge 20 to a side so as to contact a blocking element on a side of the cover 201 instead of or in addition to being raised off of the tray 240.

[0023] As described above, in the tray for a disc drive according to the present invention, since the front/rear side reverse insertion prevention unit is provided, the cartridge is always inserted in a correct state so as to prevent damage to the apparatus due to mishandling.

[0024] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.